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Environmental Radiation Data
Report 35 (July-September 1983)

(U.S.) Eastern Environmental Radiation Facility
Montgomery, AL

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Environmental Radiation Data (ERD) is compiled and distributed quarterly by the Office of Radiation Programs Eastern Environmental Radiation Facility (EERF), Montgomery, Alabama. Data from the Environmental Radiation Ambient Monitoring System (ERAMS), and similar networks operated by contributing States, Canada, Mexico, and the Pan American Health Organization are reported in (ERD) when available.

The ERAMS is comprised of nationwide sampling stations that provide air, surface, and drinking water and milk samples from which environmental radiation levels are derived. The major emphasis for ERAMS is toward identifying trends in the accumulation of long-lived radionuclides in the environment.

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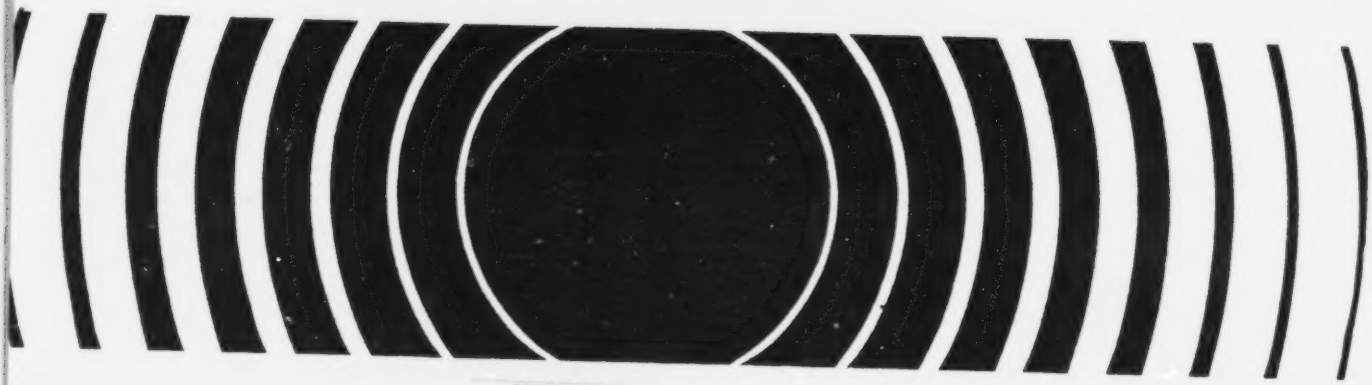

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E N V I R O N M E N T A L

R A D I A T I O N

D A T A

REPORT 35

July - September 1983

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Office of Radiation Programs

Preface

Environmental Radiation Data (ERD) is compiled and distributed quarterly by the Office of Radiation Programs' Eastern Environmental Radiation Facility (EERF), Montgomery, Alabama. Data from the Environmental Radiation Ambient Monitoring System (ERAMS), and similar networks operated by contributing States, Canada, Mexico, and the Pan American Health Organization are reported in (ERD) when available.

ERAMS was established in 1973 by the U. S. Environmental Protection Agency's Office of Radiation Programs (ORP). The ERAMS is comprised of nationwide sampling stations that provide air, surface, and drinking water and milk samples from which environmental radiation levels are derived. The major emphasis for ERAMS is toward identifying trends in the accumulation of long-lived radionuclides in the environment.

1. Sampling locations are selected to provide optimal population coverage while functioning to monitor fallout from nuclear devices and other forms of radioactive contamination of the enviromnent.

2. The radiation analyses performed on these samples include gross alpha and gross beta levels, gamma analyses for fission products and specific analyses for uranium, plutonium, strontium, iodine, radium, krypton and tritium. This monitoring effort also serves to provide ancillary information on releases into the environment from stationary sources such as nuclear power reactors, fuel fabrication and reprocessing plants and natural background levels.

ENVIRONMENTAL RADIATION DATA

CONTENTS

	Page
DATA - Reporting Rationale and Procedures	v
- Table of Reporting Increments and Minimum Detectable Levels	vii
DATA - ERAMS	
SECTION I. Air Program	1
1. Airborne Particulates and Precipitation	1
2. Plutonium and Uranium in Airborne Particulates	10
3. Krypton-85	12
SECTION II. Water Program	13
1. Surface Water	13
2. Drinking Water	18
3. Radon in Drinking Water	21
SECTION III. External Gamma Ambient Monitoring Program	22

SECTION IV. Milk Program 25

1. Pasteurized Milk 25

2. Tritium in Milk 25

3. Strontium 89 and 90 in Milk 25

4. Carbon-14 in Milk 34

DATA - STATE AGENCIES 35

1. Indiana Pasteurized Milk Program 35

2. Iowa Water Analysis and Milk Analysis 36

DATA - Reporting Rationale and Procedures

The intent of EPA's Office of Radiation Programs in establishing the Environmental Radiation Ambient Monitoring System was to provide continuous, accurate and usable environmental radiation data for the public. Therefore, new data reporting procedures were developed to allow better interpretation of the data. The most significant change in this reporting procedure is that all specific radionuclide analyses will be reported as the counting results indicate, whether the number is negative, zero, or positive.

Reporting Rationale

Frequently, concentrations of a radionuclide in environmental media are close to zero. When the actual concentration of a nuclide is zero, the net counting results should statistically show a distribution of negative and positive numbers about zero. This occurs when the background count is subtracted from a sample which has only background activity. Prior to July 1975, ERAMS data were not reported numerically when the results were less than a specified reporting level or minimum detectable level. The present reporting procedure allows all the data to be reported and evaluated statistically without an arbitrary cutoff of small or negative numbers. This approach will facilitate estimates of bias in the nuclide analyses and will allow better evaluation of distributions and trends in environmental data.

When reviewing the data in this report, caution should be exercised in the interpretation of individual negative values. Obviously, a negative activity value does not have physical significance. Such numbers, however, are significant when taken together with other observations which indicate that the true value of a distribution is near zero. When an average of several measurements produces a result less than zero, this indicates a negative bias in the measurement procedure.

(1) Reported Values

Specific Analyses - All specific radionuclide analyses will be reported as the counting results indicate, whether the number is negative, zero, or positive. Numerical values given are as of sample collection date.

Gross Analyses - The actual value of gross radioactivity measurements will be reported, unless the value is below the minimum detectable level (MDL) at the 2 sigma confidence level, then < minimum detectable level will be reported.

MDL is defined as the 3 sigma error of the background. A tabulation of MDL's is given in the following table.

(2) Reported Error Terms

Each reported value for specific analyses will be accompanied by a counting error term at the 2 sigma (95%) confidence interval. Potassium concentrations are determined by specific activity analyses. Error terms are therefore reported as counting errors. At the very low levels characteristic of most ERAMS measurements, counting error is the greatest contributor to overall error.

(3) Significant Figures

All reported values will be rounded to no more than three significant figures. The last significant figure will be increased by one if the figure following is five or greater, otherwise it is left unchanged.

(4) Reporting Levels

The reporting units, smallest increments for reporting, and minimum detectable levels for each isotope are shown in table 1. Smallest increments are sometimes considerably smaller than minimum detectable amounts to avoid truncation errors in averaging.

(5) Averages

Averages will be calculated along with appropriate error terms in an annual summary and analysis of ERAMS data. In calculating these averages, all values of individual data including negative numbers will be utilized. Averages will not be included in ERD quarterly reports.

TABLE 1

ERAMS Reporting Increments and Minimum Detectable Levels

for Radionuclide Analyses

Radionuclide	Media	Reporting Units	Reporting Increments	Minimum Detectable Levels
Gross alpha	Water	pCi/l	1 pCi/l	2 pCi/l
Gross beta	Air	pCi/m^3	.01 pCi/m^3	.01 pCi/m^3
	Water	pCi/l	1 pCi/l	1 pCi/l
	Precipitation	nCi/m^2	.01 nCi/m^2	.01 nCi/m^2(a)
Tritium	Water	nCi/l	.1 nCi/l	.2 nCi/l
	Milk	nCi/l	.1 nCi/l	.2 nCi/l
Carbon-14	Milk	pCi/l	1 pCi/l	15 pCi/l
Krypton-85	Ambient Air	pCi/m^3	.1 pCi/m^3	2 pCi/m^3
Plutonium-238, 239	Air	aCi/m^3	.1 aCi/m^3	.015 pCi(b) per sample
	Milk	pCi/l	.001 pCi/l	.015 pCi per sample
	Water	pCi/l	.001 pCi/l	.015 pCi per sample
Uranium-234, 235,238	Air	aCi/m^3	.1 aCi/m^3	.015 pCi(b) per sample
	Milk	pCi/l	.001 pCi/l	.015 pCi per sample
	Water	pCi/l	.001 pCi/l	.015 pCi per sample
Radium-226	Water	pCi/l	.1 pCi/l	.1 pCi/l
Strontium-90	Milk	pCi/l	.1 pCi/l	1 pCi/l
	Water	pCi/l	.1 pCi/l	1 pCi/l

Radionuclide	Media	Reporting Units	Reporting Increments	Minimum Detectable Levels
Strontium-89	Milk	pCi/l	1 pCi/l	5 pCi/l(c)
Iodine-131	Milk	pCi/l	1 pCi/l	10 pCi/l(c)
	Water	pCi/l	1 pCi/l	10 pCi/l(c)
	Water (specific radiochemical analysis)	pCi/l	.1 pCi/l	.4 pCi/l
Iodine-129	Milk	fCi/l	.1 fCi/l	.4 fCi/l
Iodine-127	Milk	g/l	10 g/l	10 g/l
Cesium-137	Milk	pCi/l	1 pCi/l	10 pCi/l
	Water	pCi/l	1 pCi/l	10 pCi/l
Barium-140	Milk	pCi/l	1 pCi/l	10 pCi/l(c)
	Water	pCi/l	1 pCi/l	10 pCi/l(c)
Potassium	Milk	g/l	.1 g/l	.12 g/l
	Water	g/l	.1 g/l	.12 g/l
Potassium-40	Water	pCi/l	1 pCi/l	100 pCi/l

(a) The value in terms of nCi/m^2 would be dependent on precipitation (mm).
(b) This value in terms of pCi/m^3 would be dependent on the air volume.
(c) Activity as of the day of counting.

ENVIRONMENTAL RADIATION AMBIENT MONITORING SYSTEM (ERAMS)

SECTION I. Air Program

Airborne Particulates and Precipitation

Gross beta radioactivity measurements and certain specific analyses are performed on air particulates and precipitation samples as indicator measurements in assessing the general (national) impact of all contributing sources on environmental levels of radiation.

Airborne particulates are collected continuously at field stations representing wide geographic coverage, including present and potential sources of environmental radioactivity. Sampling sites are located throughout the United States, Virgin Islands, and the Panama Canal.

Filters (10-cm diameter synthetic fiber) from air samplers are changed twice weekly and field measurements are made with a G-M survey meter at 5 hours and 29 hours after collection to allow for radon and thoron daughter product decay. Field estimates are reported to appropriate EPA officials by telephone or mail depending on the activity levels found.

The filters are sent to EERF for more sensitive analyses in a low background beta counter. Gamma scans are performed on all filters showing laboratory gross beta counts greater than 1 pCi/m^3. The lower gross beta values reported for laboratory measurements are largely due to the decay of radionuclides which occurred between the times of the field estimates and laboratory measurements.

Precipitation samples are collected at the field stations where air filters are collected. These samples are also sent to EERF where they are composited monthly for tritium, gross beta activity measurements and gamma scans.

These locations also correspond to airborne particulate and drinking water sampling locations selected for plutonium analyses. Plutonium-238, -239, and uranium-234, -235, and -238 analyses are performed annually on precipitation samples collected during March - May.

Tables 2 - 4 present the monthly average gross beta concentrations in airborne particulates for July - September 1983.

Tables 5 - 7 present the monthly average gross beta concentration in precipitation July - September 1983.

The tritium in precipitation samples for July - September 1983 at the selected stations are shown in Table 8.

A compilation of individual measurements is available from the EPA, EERF, Montgomery, AL 36193.

TABLE 2

AIRBORNE PARTICULATES
GROSS BETA CONCENTRATION
JULY 1983

LOCATION	# SAM	5-HR FIELD ESTIMATE			EERF LAB MEASUREMENT		
		MAX	MIN	AVG	MAX	MIN	AVG
		(pCi/m^3)			(pCi/m^3)		
AL:MONTGOMERY	18	1.5	0.1	0.5	0.04	0.00	0.01
CA:BERKELEY	8	0.1	0.0	0.0	0.01	0.00	0.00
CA:LOS ANGELES	9	0.7	0.2	0.4	0.02	0.01	0.01
CO:DENVER	9	0.0	0.0	0.0	0.02	0.01	0.01
CT:HARTFORD	9	0.4	0.1	0.2	0.01	0.00	0.01
DE:WILMINGTON	9	0.8	0.0	0.4	0.02	0.01	0.01
FL:JACKSONVILLE	9	0.2	0.1	0.1	0.02	0.01	0.01
FL:MIAMI	9	0.1	0.0	0.0	0.01	0.00	0.01
HI:HONOLULU	8	0.1	0.0	0.1	0.01	0.00	0.00
IA:IOWA CITY	8	1.3	0.1	0.7	0.03	0.01	0.02
ID:BOISE	9	0.3	0.0	0.2	0.02	0.00	0.01
ID:IDAHO FALLS	9	0.0	0.0	0.0	0.01	0.01	0.01
IL:CHICAGO	9	1.1	0.1	0.5	0.03	0.01	0.02
IN:INDIANAPOLIS	9	0.9	0.3	0.5	0.02	0.01	0.01
ME:AUGUSTA	8	0.3	0.1	0.2	0.01	0.00	0.01
MI:LANSING	8	0.5	0.1	0.3	0.02	0.01	0.01
MN:MINNEAPOLIS	9	1.1	0.0	0.4	0.04	0.01	0.02
MO:JEFFERSON CITY	9	1.1	0.1	0.5	0.09	0.01	0.03
MS:JACKSON	8	1.4	0.1	0.5	0.02	0.01	0.02
ND:BISMARCK	9	0.6	0.1	0.4	0.03	0.01	0.02
NH:CONCORD	9	5.5	0.6	2.3	0.01	0.00	0.01
NJ:TRENTON	5	0.1	0.1	0.1	0.01	0.00	0.01
NV:LAS VEGAS	8	0.5	0.2	0.4	0.03	0.00	0.01
NY:ALBANY	9	0.3	0.1	0.2	0.01	0.00	0.01
NY:NIAGARA FALLS	9	0.4	0.1	0.2	0.01	0.00	0.01
NY:SYRACUSE	4	0.2	0.0	0.1	0.01	0.01	0.01
NY:YAPHANK	9	0.0	0.0	0.0	0.01	0.00	0.01
OH:COLUMBUS	8	0.6	0.1	0.4	0.02	0.00	0.01
OH:PAINESVILLE	9	0.7	0.1	0.4	0.02	0.01	0.02
OH:TOLEDO	7	0.4	0.1	0.2	0.02	0.01	0.01
OK:OKLAHOMA CITY	8	1.1	0.1	0.7	0.03	0.01	0.02
OR:PORTLAND	9	0.0	0.0	0.0	0.00	0.00	0.00
PA:HARRISBURG	9	1.3	0.1	0.5	0.02	0.01	0.01
PA:PITTSBURGH	9	0.2	0.0	0.1	0.02	0.00	0.01
RI:PROVIDENCE	8	0.4	0.1	0.2	0.01	0.01	0.01
SC:BARNWELL	2	0.0	0.0	0.0	0.02	0.01	0.01
SC:COLUMBIA	7	1.5	0.2	0.5	0.03	0.00	0.01
SD:PIERRE	8	0.2	0.1	0.2	0.02	0.01	0.01
TN:KNOXVILLE	6	1.2	0.1	0.6	0.06	0.01	0.03
TN:NASHVILLE	8	0.0	0.0	0.0	0.04	0.01	0.02
TX:AUSTIN	5	2.7	0.5	1.5	0.04	0.01	0.02
TX:EL PASO	1	0.7	0.7	0.7	0.01	0.01	0.01
UT:SALT LAKE CITY	9	0.2	0.0	0.1	0.02	0.01	0.01
VA:LYNCHBURG	9	1.8	0.0	0.7	0.03	0.01	0.02
WA:SEATTLE	9	0.1	0.0	0.0	0.02	0.00	0.00
WA:SPOKANE	8	0.2	0.1	0.2	0.01	0.00	0.01
WV:CHARLESTON	7	0.5	0.0	0.2	0.02	0.01	0.01
WY:CHEYENNE	1	5.7	5.7	5.7	0.01	0.01	0.01

MINIMUM DETECTABLE LIMIT FOR FIELD ESTIMATES - .1 pCi/m^3
MINIMUM DETECTABLE LIMIT FOR LAB MEASUREMENT - .01 pCi/m^3

TABLE 3

AIRBORNE PARTICULATES
GROSS BETA CONCENTRATION
AUGUST 1983

LOCATION	# SAM	5-HR FIELD ESTIMATE			EERF LAB MEASUREMENT		
		MAX	MIN	AVG	MAX	MIN	AVG
		(pCi/m^3)			(pCi/m^3)		
AL:MONTGOMERY	18	3.4	0.1	1.0	0.04	0.00	0.01
CA:BERKELEY	9	0.1	0.0	0.0	0.01	0.00	0.00
CA:LOS ANGELES	9	1.2	0.2	0.6	0.04	0.01	0.01
CO:DENVER	8	0.0	0.0	0.0	0.03	0.01	0.02
CT:HARTFORD	9	0.4	0.1	0.2	0.01	0.00	0.01
DE:WILMINGTON	8	1.8	0.1	0.6	0.02	0.01	0.01
FL:JACKSONVILLE	9	0.1	0.0	0.1	0.01	0.00	0.01
FL:MIAMI	9	0.1	0.0	0.0	0.01	0.00	0.00
HI:HONOLULU	9	0.2	0.0	0.1	0.01	0.00	0.00
IA:IOWA CITY	7	1.0	0.2	0.7	0.09	0.01	0.03
ID:BOISE	8	0.8	0.2	0.5	0.03	0.01	0.02
ID:IDAHO FALLS	8	0.0	0.0	0.0	0.01	0.01	0.01
IL:CHICAGO	9	1.1	0.1	0.4	0.03	0.01	0.02
IN:INDIANAPOLIS	8	0.9	0.4	0.7	0.03	0.01	0.02
ME:AUGUSTA	9	0.8	0.1	0.3	0.01	0.00	0.01
MI:LANSING	9	0.3	0.1	0.2	0.02	0.01	0.01
MN:MINNEAPOLIS	9	0.6	0.1	0.3	0.02	0.01	0.01
MO:JEFFERSON CITY	9	2.2	0.4	1.0	0.15	0.00	0.04
MS:JACKSON	8	0.5	0.1	0.3	0.03	0.00	0.02
ND:BISMARCK	9	0.7	0.2	0.4	0.03	0.01	0.02
NH:CONCORD	9	11.4	0.7	4.5	0.01	0.00	0.01
NV:LAS VEGAS	9	0.7	0.2	0.4	0.01	0.01	0.01
NY:ALBANY	9	0.3	0.1	0.2	0.02	0.00	0.01
NY:NIAGARA FALLS	9	0.4	0.1	0.2	0.02	0.00	0.01
NY:YAPHANK	4	0.0	0.0	0.0	0.01	0.00	0.01
OH:COLUMBUS	9	0.7	0.4	0.6	0.03	0.01	0.02
OH:PAINESVILLE	9	1.0	0.1	0.4	0.02	0.01	0.01
OH:TOLEDO	9	0.3	0.0	0.1	0.02	0.01	0.01
OK:OKLAHOMA CITY	1	1.3	1.3	1.3	0.02	0.02	0.02
OR:PORTLAND	9	0.0	0.0	0.0	0.01	0.00	0.00
PA:HARRISBURG	9	1.1	0.5	0.8	0.02	0.01	0.02
PA:PITTSBURGH	9	0.2	0.1	0.2	0.02	0.01	0.01
RI:PROVIDENCE	8	0.2	0.0	0.1	0.01	0.00	0.01
SC:BARNWELL	2	0.0	0.0	0.0	0.02	0.01	0.01
SC:COLUMBIA	9	0.9	0.3	0.6	0.04	0.01	0.03
SD:PIERRE	9	0.4	0.1	0.2	0.04	0.01	0.02
TN:KNOXVILLE	8	1.8	0.3	0.9	0.04	0.01	0.03
TN:NASHVILLE	16	0.0	0.0	0.0	0.08	0.00	0.03
UT:SALT LAKE CITY	8	0.2	0.0	0.1	0.01	0.00	0.01
VA:LYNCHBURG	9	2.3	0.0	0.9	0.07	0.01	0.02
WA:SEATTLE	9	0.0	0.0	0.0	0.00	0.00	0.00
WA:SPOKANE	9	0.2	0.1	0.2	0.02	0.01	0.01
WV:CHARLESTON	8	0.4	0.1	0.2	0.03	0.01	0.02

MINIMUM DETECTABLE LIMIT FOR FIELD ESTIMATES - .1 pCi/m^3
MINIMUM DETECTABLE LIMIT FOR LAB MEASUREMENT - .01 pCi/m^3

TABLE 4

AIRBORNE PARTICULATES
GROSS BETA CONCENTRATION
SEPTEMBER 1983

LOCATION	# SAM	5-HR FIELD ESTIMATE			EERF LAB MEASUREMENT		
		MAX	MIN	AVG	MAX	MIN	AVG
		(pCi/m^3)			(pCi/m^3)		
AL:MONTGOMERY	18	3.4	0.1	0.9	0.03	0.01	0.01
CA:BERKELEY	9	0.1	0.0	0.1	0.01	0.00	0.01
CA:LOS ANGELES	9	2.0	0.1	0.6	0.02	0.01	0.01
CO:DENVER	7	0.0	0.0	0.0	0.04	0.01	0.02
CT:HARTFORD	9	0.4	0.1	0.2	0.02	0.00	0.01
DE:WILMINGTON	9	0.8	0.1	0.4	0.01	0.01	0.01
FL:JACKSONVILLE	6	0.1	0.0	0.0	0.01	0.00	0.01
FL:MIAMI	9	0.0	0.0	0.0	0.01	0.00	0.01
HI:HONOLULU	9	0.1	0.0	0.1	0.01	0.00	0.00
IA:IOWA CITY	8	0.5	0.0	0.2	0.03	0.01	0.01
ID:BOISE	8	1.6	0.1	0.7	0.04	0.02	0.02
ID:IDAHO FALLS	9	0.0	0.0	0.0	0.01	0.01	0.01
IL:CHICAGO	8	0.7	0.1	0.3	0.04	0.01	0.02
IN:INDIANAPOLIS	7	1.3	0.0	0.6	0.03	0.01	0.02
ME:AUGUSTA	9	0.6	0.1	0.3	0.02	0.01	0.01
MI:LANSING	9	0.7	0.1	0.3	0.02	0.00	0.01
MN:MINNEAPOLIS	1	0.3	0.3	0.3	0.01	0.01	0.01
MO:JEFFERSON CITY	9	2.7	0.2	1.1	0.11	0.01	0.04
MS:JACKSON	8	1.0	0.1	0.5	0.05	0.01	0.03
ND:BISMARCK	8	0.9	0.2	0.5	0.02	0.01	0.02
NH:CONCORD	9	2.0	0.2	0.8	0.02	0.01	0.01
NV:LAS VEGAS	9	1.0	0.4	0.6	0.02	0.01	0.01
NY:ALBANY	8	0.4	0.1	0.3	0.02	0.01	0.01
NY:NIAGARA FALLS	9	0.7	0.1	0.2	0.02	0.01	0.01
NY:SYRACUSE	1	0.0	0.0	0.0	0.01	0.01	0.01
OH:COLUMBUS	9	0.9	0.2	0.5	0.03	0.01	0.02
OH:PAINESVILLE	9	0.5	0.1	0.3	0.02	0.01	0.01
OH:TOLEDO	9	0.3	0.1	0.2	0.03	0.01	0.02
OK:OKLAHOMA CITY	4	0.8	0.2	0.5	0.03	0.01	0.02
OR:PORTLAND	9	0.0	0.0	0.0	0.01	0.00	0.00
PA:HARRISBURG	9	1.1	0.2	0.7	0.03	0.01	0.02
PA:PITTSBURGH	9	0.2	0.1	0.1	0.02	0.01	0.01
RI:PROVIDENCE	7	0.3	0.2	0.3	0.02	0.01	0.01
SC:BARNWELL	2	0.0	0.0	0.0	0.01	0.01	0.01
SC:COLUMBIA	9	0.8	0.1	0.5	0.04	0.01	0.02
SD:PIERRE	8	0.3	0.1	0.2	0.02	0.01	0.01
TN:KNOXVILLE	9	2.0	0.3	1.3	0.14	0.01	0.04
TX:AUSTIN	6	1.7	0.3	1.1	0.02	0.01	0.01
UT:SALT LAKE CITY	9	0.3	0.0	0.1	0.01	0.00	0.01
VA:LYNCHBURG	9	1.5	0.1	1.0	0.06	0.01	0.02
WA:SEATTLE	8	0.0	0.0	0.0	0.01	0.00	0.00
WA:SPOKANE	9	0.8	0.0	0.3	0.03	0.00	0.01
WI:MADISON	3	0.5	0.2	0.3	0.02	0.00	0.01
WV:CHARLESTON	4	0.5	0.2	0.4	0.03	0.01	0.02

MINIMUM DETECTABLE LIMIT FOR FIELD ESTIMATES - .1 pCi/m^3
MINIMUM DETECTABLE LIMIT FOR LAB MEASUREMENT - .01 pCi/m^3

TABLE 5

GROSS BETA CONCENTRATION IN PRECIPITATION

JULY 1983

LOCATION	DEPTH	ACT. ± 2s		SPECIFIC GAMMA ACT.
	(mm)	(nCi/m^2)		(pCi/l)
AL:MONTGOMERY	80.0	0.26	0.05	ND
CO:DENVER	17.8	0.02	0.01	ND
CT:HARTFORD	96.3	0.47	0.07	ND
FL:JACKSONVILLE	219.6	0.35	0.11	ND
ID:BOISE	49.3	0.07	0.03	ND
IL:CHICAGO	18.4	0.03	0.01	ND
IN:INDIANAPOLIS	25.0	0.02	0.01	ND
MI:LANSING	28.2	0.02	0.01	ND
MN:MINNEAPOLIS	30.0	0.03	0.01	ND
MS:JACKSON	41.3	0.33	0.04	ND
ND:BISMARCK	19.5	0.03	0.01	ND
NY:NEW YORK CITY	20.0	0.03	0.01	ND
NY:NIAGARA FALLS	47.8	0.04	0.02	ND
OH:COLUMBUS	52.0	0.03	0.02	ND
OH:PAINESVILLE	66.9	0.05	0.03	ND
OH:TOLEDO	95.0	0.17	0.06	ND
OR:PORTLAND	60.1	0.12	0.03	ND
PA:HARRISBURG	28.8	0.03	0.01	ND
PA:PITTSBURGH	124.8	0.07	0.06	ND
SC:BARNWELL	27.5	0.10	0.02	ND
SC:CHARLESTON	92.5	0.07	0.05	ND
SC:COLUMBIA	190.0	0.42	0.11	ND
SD:PIERRE	6.2	0.02	0.00	ND
TX:AUSTIN	17.5	0.01	0.01	ND
VA:LYNCHBURG	49.3	0.50	0.05	ND

ND NO GAMMA ACTIVITY DETECTABLE
s SIGMA COUNTING ERROR

TABLE 6

GROSS BETA CONCENTRATION IN PRECIPITATION

AUGUST 1983

LOCATION	DEPTH	ACT. ± 2s		SPECIFIC GAMMA ACT.
	(mm)	(nCi/m^2)		(pCi/l)
AL:MONTGOMERY	100.0	0.25	0.06	ND
CO:DENVER	60.3	0.07	0.03	ND
CT:HARTFORD	82.5	0.32	0.06	ND
FL:JACKSONVILLE	196.6	0.31	0.11	ND
ID:BOISE	5.3	0.02	0.00	ND
ID:IDAHO FALLS	37.8	0.08	0.03	ND
IL:CHICAGO	25.5	0.05	0.02	ND
IN:INDIANAPOLIS	22.5	0.04	0.01	ND
MI:LANSING	98.1	0.09	0.05	ND
MN:MINNEAPOLIS	139.3	0.20	0.07	ND
MS:JACKSON	44.4	0.03	0.02	ND
ND:BISMARCK	33.8	0.03	0.02	ND
NJ:TRENTON	11.9	0.14	0.01	ND
NV:LAS VEGAS	63.5	0.09	0.03	ND
NY:NEW YORK CITY	120.0	0.37	0.08	ND
NY:NIAGARA FALLS	117.8	0.12	0.06	ND
OH:CINCINNATI	5.0	0.01	0.00	ND
OH:COLUMBUS	61.3	0.03	0.03	ND
OH:PAINESVILLE	63.8	0.19	0.04	ND
OH:TOLEDO	178.4	0.38	0.10	ND
PA:HARRISBURG	29.2	0.11	0.02	ND
PA:PITTSBURGH	95.0	0.23	0.05	ND
SC:BARNWELL	46.5	0.09	0.02	ND
SC:COLUMBIA	14.5	0.11	0.01	ND
SD:PIERRE	40.0	0.07	0.02	ND
TX:EL PASO	50.0	0.07	0.02	ND
VA:LYNCHBURG	25.0	0.77	0.04	ND
WV:CHARLESTON	87.5	0.14	0.04	ND

ND NO GAMMA ACTIVITY DETECTABLE
s SIGMA COUNTING ERROR

TABLE 7

GROSS BETA CONCENTRATION IN PRECIPITATION

SEPTEMBER 1983

LOCATION	DEPTH (mm)	ACT. ± 2s (nCi/m^2)		SPECIFIC GAMMA ACT. (pCi/l)
AL:MONTGOMERY	95.0	0.32	0.06	ND
CA:BERKELEY	11.6	0.01	0.01	ND
CO:DENVER	8.0	0.02	0.00	ND
CT:HARTFORD	52.8	0.12	0.03	ND
FL:JACKSONVILLE	201.4	0.26	0.10	ND
FL:MIAMI	137.5	0.33	0.08	ND
ID:IDAHO FALLS	53.0	0.12	0.03	ND
IL:CHICAGO	55.8	0.04	0.03	ND
IN:INDIANAPOLIS	41.3	0.03	0.02	ND
MI:LANSING	100.3	0.09	0.05	ND
MN:MINNEAPOLIS	102.5	0.13	0.00	ND
MO:JEFFERSON CITY	102.1	0.05	0.04	ND
MS:JACKSON	95.8	0.18	0.06	ND
ND:BISMARCK	32.1	0.05	0.02	ND
NJ:TRENTON	9.5	0.05	0.01	ND
NV:LAS VEGAS	46.5	0.07	0.02	ND
NY:NEW YORK CITY	36.3	0.12	0.02	ND
NY:NIAGARA FALLS	64.6	0.05	0.03	ND
OH:COLUMBUS	76.5	0.07	0.04	ND
OH:PAINESVILLE	173.1	0.36	0.09	ND
OH:TOLEDO	92.5	0.20	0.05	ND
OR:PORTLAND	50.3	0.03	0.02	ND
PA:HARRISBURG	43.0	0.06	0.02	ND
PA:PITTSBURGH	54.5	0.09	0.03	ND
RI:PROVIDENCE	43.7	0.20	0.03	ND
SC:BARNWELL	38.8	0.04	0.02	ND
SC:COLUMBIA	93.5	0.49	0.07	ND
SD:PIERRE	7.5	0.02	0.00	ND
TX:AUSTIN	35.0	0.05	0.02	ND
TX:EL PASO	10.0	0.02	0.01	ND
VA:VIRGINIA BEACH	168.0	0.53	0.11	ND
WI:MADISON	16.3	0.03	0.01	ND

ND NO GAMMA ACTIVITY DETECTABLE
s SIGMA COUNTING ERROR

TABLE 8

PRECIPITATION
TRITIUM CONCENTRATION

JULY - SEPTEMBER 1983

LOCATION	JULY nCi/l ± 2s	AUGUST nCi/l ± 2s	SEPTEMBER nCi/l ± 2s
AL:MONTGOMERY	0.2 0.2	0.1 0.2	0.3 0.2
CA:BERKELEY	NS	NS	0.2 0.2
CO:DENVER	0.2 0.2	0.4 0.2	0.1 0.2
CT:HARTFORD	0.3 0.2	0.1 0.2	0.2 0.2
FL:JACKSONVILLE	0.1 0.2	0.1 0.2	0.2 0.2
FL:MIAMI	NS	NS	0.1 0.2
ID:BOISE	0.2 0.2	0.2 0.2	NS
ID:IDAHO FALLS	NS	0.4 0.2	0.2 0.2
IL:CHICAGO	0.1 0.2	0.3 0.2	0.2 0.2
IN:INDIANAPOLIS	0.1 0.2	0.4 0.2	0.2 0.2
MI:LANSING	0.2 0.2	0.3 0.2	0.2 0.2
MN:MINNEAPOLIS	0.2 0.2	0.1 0.2	0.3 0.2
MO:JEFFERSON CITY	NS	NS	0.1 0.2
MS:JACKSON	0.3 0.2	0.2 0.2	0.2 0.2
ND:BISMARCK	0.3 0.2	0.4 0.2	0.1 0.2
NJ:TRENTON	NS	0.1 0.2	0.2 0.2
NV:LAS VEGAS	NS	0.2 0.2	0.1 0.2
NY:NEW YORK CITY	0.3 0.2	0.1 0.2	0.3 0.2
NY:NIAGARA FALLS	0.3 0.2	0.2 0.2	0.2 0.2
OH:CINCINNATI	NS	0.4 0.2	NS
OH:COLUMBUS	0.2 0.2	0.2 0.2	0.3 0.2
OH:PAINESVILLE	0.2 0.2	0.3 0.2	0.2 0.2
OH:TOLEDO	0.2 0.2	0.4 0.2	0.1 0.2
OR:PORTLAND	0.3 0.2	NS	0.2 0.2
PA:HARRISBURG	0.3 0.2	0.2 0.2	0.1 0.2
PA:PITTSBURGH	0.2 0.2	0.2 0.2	0.2 0.2
RI:PROVIDENCE	NS	NS	0.2 0.2
SC:BARNWELL	1.8 0.2	1.6 0.2	0.7 0.2
SC:CHARLESTON	0.2 0.2	NS	NS
SC:COLUMBIA	0.7 0.2	0.5 0.2	0.8 0.2
SD:PIERRE	0.2 0.2	0.4 0.2	0.1 0.2
TX:AUSTIN	0.2 0.2	NS	0.2 0.2
TX:EL PASO	NS	0.3 0.2	0.1 0.2
VA:LYNCHBURG	0.4 0.2	0.2 0.2	NS
VA:VIRGINIA BEACH	NS	NS	0.2 0.2
WI:MADISON	NS	NS	0.1 0.2
WV:CHARLESTON	NS	0.1 0.2	NS

NS NO SAMPLE
s SIGMA COUNTING ERROR

Plutonium and Uranium in Airborne Particulates

Environmental radiation levels of plutonium and uranium are determined by the analyses of quarterly composite samples (air filters) collected from the continuously operating airborne particulate samplers. The number of continuously operating stations is being increased from the original 22 will eventually number 67 when all equipment is operational.

Analyses of the composited filters consist of ashing, separating by liquid ion exchange, and coprecipitation of the plutonium or uranium.

Concentration of the specific isotopes of plutonium-238, -239, and uranium-234, -235, and -238 are determined by alpha spectroscopy. The volume of air analyzed normally ranges from 25,000 to 40,000 m^3 for each quarterly composite.

Plutonium and uranium in airborne particulates data for April - June 1983 are shown for the 44 stations operating during this period in Table 9.

TABLE 9

PLUTONIUM AND URANIUM IN AIRBORNE PARTICULATES
APRIL - JUNE 1983 COMPOSITES

LOCATION	^{238}Pu		^{239}Pu		^{234}U		^{235}U		^{238}U	
	aCi/m^3	± 2s	aCi/m^3	± 2s	aCi/m^3	± 2s	aCi/m^3	± 2s	aCi/m^3	± 2s
AL:MONTGOMERY	0.2	0.3	1.8	0.8	8.3	1.8	0.5	0.4	11.1	2.1
CA:BERKELEY	0.2	0.5	0.8	0.5	7.1	2.0	0.2	0.4	8.9	2.2
CA:LOS ANGELES	0.6	1.5	2.0	1.2	23.1	5.2	0.6	1.1	29.5	6.1
CO:DENVER	0.1	0.4	1.6	0.7	37.4	5.4	0.4	0.7	24.9	4.0
CT:HARTFORD	0.8	1.1	2.2	1.0	16.8	3.8	1.4	1.0	14.9	3.6
DE:WILMINGTON	-0.1	0.4	1.3	0.8	12.6	2.6	0.7	0.6	11.1	2.4
FL:JACKSONVILLE	1.2	1.3	2.8	1.6	14.1	3.9	1.3	1.1	15.9	4.0
FL:MIAMI	0.3	0.3	1.7	0.6	24.4	3.8	0.9	0.5	18.3	3.1
HI:HONOLULU	3.8	1.6	2.3	1.1	3.2	1.0	0.5	0.4	4.3	1.2
IA:IOWA CITY	0.4	0.4	1.5	0.7	25.0	4.0	0.8	0.5	25.3	4.0
ID:BOISE	0.5	0.9	2.4	1.0	15.2	2.6	0.5	0.4	13.6	2.5
ID:IDAHO FALLS	3.4	1.9	4.8	2.0	38.9	6.2	1.5	0.9	49.4	7.4
IL:CHICAGO	1.3	1.6	2.1	1.5	46.2	7.6	2.1	1.2	44.6	7.4
IN:INDIANAPOLIS	0.1	0.8	3.6	1.5	55.9	8.4	0.2	0.4	53.3	8.1
ME:AUGUSTA	0.4	0.4	0.7	0.5	14.3	2.6	1.1	0.6	15.4	2.7
MI:LANSING	0.4	0.5	1.4	0.6	20.8	3.0	0.9	0.5	23.0	3.2
MN:MINNEAPOLIS	0.0	0.5	1.7	0.7	21.5	3.7	1.1	0.7	17.8	3.2
MO:JEFFERSON CITY	-0.3	0.4	1.2	0.7	11.6	2.3	4.7	1.3	13.1	2.5
ND:BISMARCK	0.1	0.2	1.6	0.7	6.1	0.7	0.2	0.1	5.9	0.7
NH:CONCORD	0.1	0.5	2.6	1.0	11.3	2.1	0.4	0.4	9.3	1.9
NJ:TRENTON	0.2	0.2	1.5	0.6	16.1	3.0	1.2	0.7	16.6	3.0
NV:LAS VEGAS	1.3	1.1	3.5	1.4	112.9	15.5	3.6	1.8	72.6	10.9
NY:ALBANY	0.1	0.3	1.6	1.1	27.8	5.4	1.5	1.0	30.7	5.7
NY:NIAGARA FALLS	0.6	0.7	0.9	0.5	45.8	7.4	1.5	0.9	44.0	7.1
NY:SYRACUSE	1.1	0.5	1.6	0.6	30.1	4.7	2.7	1.0	22.6	3.9
NY:YAPHANK	0.7	0.7	1.5	0.8	9.6	2.1	0.6	0.5	7.7	1.8
OH:COLUMBUS	0.1	0.2	1.9	0.7	39.2	6.8	2.0	1.1	34.9	6.2
OH:PAINESVILLE	-0.2	0.3	2.4	0.8	26.0	4.5	1.0	0.6	28.4	4.8
OR:PORTLAND	0.8	0.7	0.9	0.6	5.6	1.7	0.3	0.4	6.3	1.8
PA:HARRISBURG	0.8	0.9	2.4	1.1	26.3	4.1	1.6	0.8	27.4	4.2
PA:PITTSBURGH	0.0	0.5	0.5	0.6	36.6	4.9	1.2	0.6	33.5	4.5
RI:PROVIDENCE	0.3	0.3	1.6	0.7	15.7	2.6	0.8	0.5	14.7	2.4
SC:BARNWELL	0.1	0.4	2.1	0.8	17.6	2.8	0.7	0.4	17.3	2.8
SC:COLUMBIA	0.5	0.7	1.6	0.8	45.2	11.9	1.4	1.4	44.5	11.6
SD:PIERRE	0.5	1.0	1.6	0.9	23.5	3.7	1.0	0.6	21.2	3.4
TN:KNOXVILLE	1.7	1.2	2.3	1.0	25.0	4.4	0.6	0.5	26.6	4.5
TN:NASHVILLE	0.1	0.5	2.0	0.8	30.5	5.1	1.7	0.9	35.8	5.7
TX:AUSTIN	0.4	0.4	1.8	0.7	13.0	2.4	0.3	0.4	14.3	2.6
UT:SALT LAKE CITY	0.4	0.5	2.2	0.9	25.4	4.4	4.1	1.5	26.4	4.5
VA:LYNCHBURG	0.1	0.4	2.2	0.7	406.9	44.9	12.3	2.4	15.1	2.8
WA:SEATTLE	0.8	0.6	0.8	0.5	7.4	1.4	0.2	0.2	6.6	1.3
WA:SPOKANE	-0.2	1.2	1.8	1.1	31.5	6.3	0.9	0.8	31.2	6.3
WI:MADISON	0.0	0.5	1.0	0.5	12.9	2.6	0.4	0.4	14.4	2.8
WV:CHARLESTON	0.6	0.5	1.1	0.6	2.7	0.4	0.1	0.1	2.4	0.3

s SIGMA COUNTING ERROR

Krypton-85

Krypton-85 is a long-lived noble gas with a half life of 10.8 years. It is released into the atmosphere by nuclear reactor operations, fuel fabrication, fuel reprocessing, and nuclear detonations. Krypton-85 also occurs naturally in minor quantities primarily from the neutron capture of stable krypton-84 as well as spontaneous fission and neutron-induced fission of uranium. Monitoring of krypton-85 in the atmosphere has been conducted to identify and establish baseline levels and long-term trends.

Krypton-85 analysis began in January 1973 with sample collections and analyses being performed for 12 sampling locations. These locations were selected to provide atmospheric coverage of the United States with considerations being given to the proximity to fuel reprocessing plants, nuclear reactors, and wide geographic coverage.

Dry compressed air samples, collected at each location, are purchased from commercial air suppliers annually and shipped to the EERF where the krypton-85 is cryogenically separated and counted in a liquid scintillation system.

The Kr-85 results will be published when they are available.

ERAMS

SECTION II. Water Program

The ERAMS water program provides ambient radiation data to assess the effects of the nuclear power industry, the natural radiation environment, and other nuclear sources on the nation's rivers, streams and drinking water supplies.

Surface Water

Grab samples are taken quarterly at 58 stations located downstream from operating or future nuclear facilities.

Surface water monitoring consists of tritium analyses quarterly and gamma scans annually. Tritium is the primary radioactive pollutant from nuclear power plants.

Tritium concentrations are determined by liquid scintillation counting of distilled samples. Gamma scans are performed annually to determine if there is a buildup of other contaminants.

Tritium concentrations for surface water samples for July - September 1983 are given in Table 10.

Results from the 1983 annual gamma analyses of surface water are shown in Table 11.

TABLE 10

SURFACE WATER
TRITIUM CONCENTRATION

JULY - SEPTEMBER 1983

LOCATION	SOURCE	DATE COLLECTED	nCi/l	± 2s
AL:DECATUR	TENNESSEE RIVER	7/ 7/83	0.2	0.2
AL:DOTHAN	CHATTAHOOCHEE RIVER	7/10/83	0.4	0.2
AL:SCOTTSBORO	TENNESSEE RIVER	7/ 8/83	0.4	0.2
CA:CLAY STATION	FOLSOM S. CANAL	7/21/83	0.3	0.2
CA:DIABLO CANYON	PACIFIC OCEAN	7/15/83	0.1	0.2
CA:EUREKA	HUMBOLDT BAY	7/ 7/83	0.2	0.2
CA:SAN ONOFRE	PACIFIC OCEAN	9/16/83	0.2	0.2
CO:GREELEY	SOUTH PLATTE RIVER	7/15/83	0.3	0.2
CT:EAST HADDAM	CONNECTICUT RIVER	9/15/83	0.2	0.2
CT:WATERFORD	LONG ISLAND SOUND	9/14/83	0.2	0.2
FL:CRYSTAL RIVER	GULF OF MEXICO	7/ 5/83	0.2	0.2
FL:FT. PIERCE	ATLANTIC OCEAN	7/ 6/83	0.2	0.2
FL:HOMESTEAD	BISCAYNE BAY	7/13/83	0.2	0.2
IA:CEDAR RAPIDS	CEDAR RIVER	7/12/83	0.3	0.2
ID:BUHL	SNAKE RIVER	7/ 8/83	0.4	0.2
IL:E. MOLINE	MISSISSIPPI RIVER	7/11/83	0.4	0.2
IL:MOLINE	MISSISSIPPI RIVER	7/15/83	0.2	0.2
IL:MORRIS	ILLINOIS RIVER	7/31/83	0.3	0.2
IL:OREGON	ROCK RIVER	7/15/83	0.5	0.2
IL:ZION	LAKE MICHIGAN	8/ 2/83	0.3	0.2
LA:NEW ORLEANS	MISSISSIPPI RIVER	7/11/83	0.2	0.2
MA:PLYMOUTH	CAPE CODE BAY	7/ 6/83	0.4	0.2
MA:ROWE	DEERFIELD RIVER	7/29/83	0.4	0.2
MD:CONOWINGO	SUSQUEHANNA RIVER	7/12/83	0.3	0.2
MD:LUSBY	CHESAPEAKE BAY	7/19/83	0.3	0.2
ME:WISCASSET	MONTSEWAY BAY	7/ 5/83	0.3	0.2
MI:BRIDGMAN	LAKE MICHIGAN	7/12/83	0.6	0.2
MI:CHARLEVOIX	LAKE MICHIGAN	7/ 9/83	0.3	0.2
MI:MONROE	LAKE ERIE	7/11/83	0.4	0.2
MI:SOUTH HAVEN	LAKE MICHIGAN	7/11/83	0.3	0.2
MN:MONTICELLO	MISSISSIPPI RIVER	7/ 6/83	0.2	0.2
MN:RED WING	MISSISSIPPI RIVER	7/ 7/83	0.3	0.2
MS:PORT GIBSON	MISSISSIPPI RIVER	7/21/83	0.2	0.2
NC:CHARLOTTE	CATAWBA RIVER	7/11/83	0.3	0.2
NC:SOUTHPORT	ATLANTIC OCEAN	7/ 5/83	0.1	0.2
NE:RULO	MISSOURI RIVER	7/12/83	0.3	0.2
NJ:BAYSIDE	DELAWARE RIVER	7/12/83	0.3	0.2
NJ:OYSTER CREEK	OYSTER CREEK	7/ 7/83	0.2	0.2
NV:BOULDER CITY	COLORADO RIVER	7/ 6/83	0.3	0.2
NY:OSSINING	HUDSON RIVER	8/10/83	0.3	0.2
NY:OSWEGO	LAKE ONTARIO	7/28/83	0.3	0.2
NY:POUGHKEEPSIE	HUDSON RIVER	7/ 6/83	0.1	0.2
OH:TOLEDO	LAKE ERIE	7/ 1/83	0.3	0.2
OR:BRADWOOD	COLUMBIA RIVER	8/ 6/83	0.3	0.2
PA:DANVILLE	SUSQUEHANNA RIVER	7/13/83	0.2	0.2

TABLE 10 (CONTINUED)

SURFACE WATER
TRITIUM CONCENTRATION

JULY - SEPTEMBER 1983

LOCATION	SOURCE	DATE COLLECTED	nCi/l	± 2s
SC:ALLENDALE	SAVANNAH RIVER	7/28/83	4.0	0.3
SC:BROAD RIVER	BROAD RIVER	7/13/83	0.2	0.2
SC:HARTSVILLE	LAKE ROBINSON	7/25/83	0.8	0.2
TN:DAISY	TENNESSEE RIVER	8/ 4/83	0.2	0.2
TN:KINGSTON	CLINCH RIVER	7/ 6/83	0.8	0.2
TX:EL PASO	RIO GRANDE	7/26/83	0.3	0.2
TX:MATAGORDA	COLORADO RIVER	7/20/83	0.1	0.2
VA:DOSWELL	NORTH ANNA RIVER	7/ 8/83	2.0	0.2
WA:NORTHPORT	COLUMBIA RIVER	7/ 5/83	0.2	0.2
WA:RICHLAND	COLUMBIA RIVER	7/13/83	0.3	0.2
WI:TWO CREEKS	LAKE MICHIGAN	7/12/83	0.3	0.2
WI:VICTORY	MISSISSIPPI RIVER	7/12/83	0.2	0.2
WV:WHEELING	OHIO RIVER	7/ 6/83	0.3	0.2

s SIGMA COUNTING ERROR

TABLE 11

SURFACE WATER
ANNUAL GAMMA ANALYSIS

1983

LOCATION	SOURCE	DATE COLLECTED	GAMMA pC1/1 ± 2s
AL:DECATUR	TENNESSEE RIVER	7/ 7/83	ND
AL:DOTHAN	CHATTAHOOCHIE RIVER	7/10/83	ND
AL:SCOTTSBORO	TENNESSEE RIVER	7/ 8/83	ND
CA:CLAY STATION	FOLSOM S. CANAL	7/21/83	ND
CA:DIABLO CANYON	PACIFIC OCEAN	7/15/83	ND
CA:EUREKA	HUMBOLDT BAY	7/ 7/83	^{40}K 245 ± 34%
CA:SAN ONOFRE	PACIFIC OCEAN	9/16/83	^{40}K 297 ± 60%
CO:GREELEY	SOUTH PLATTE RIVER	7/15/83	ND
CT:EAST HADDAM	CONNECTICUT RIVER	9/15/83	ND
CT:WATERFORD	LONG ISLAND SOUND	9/14/83	^{40}K 217 ± 39%
FL:CRYSTAL RIVER	GULF OF MEXICO	7/ 5/83	ND
FL:FT. PIERCE	ATLANTIC OCEAN	7/ 6/83	ND
FL:HOMESTEAD	BISCAYNE BAY	7/13/83	ND
IA:CEDAR RAPIDS	CEDAR RIVER	7/12/83	ND
ID:BUHL	SNAKE RIVER	7/ 8/83	ND
IL:E. MOLINE	MISSISSIPPI RIVER	7/11/83	ND
IL:MOLINE	MISSISSIPPI RIVER	7/15/83	ND
IL:MORRIS	ILLINOIS RIVER	7/31/83	ND
IL:OREGON	ROCK RIVER	7/15/83	ND
IL:ZION	LAKE MICHIGAN	8/ 2/83	ND
LA:NEW ORLEANS	MISSISSIPPI RIVER	7/11/83	ND
MA:PLYMOUTH	CAPE CODE BAY	7/ 6/83	ND
MA:ROWE	DEERFIELD RIVER	7/29/83	ND
MD:CONOWINGO	SUSQUEHANNA RIVER	7/12/83	ND
MD:LUSBY	CHESAPEAKE BAY	7/19/83	ND
ME:WISCASSET	MONTSEWAY BAY	7/ 5/83	ND
MI:BRIDGMAN	LAKE MICHIGAN	7/12/83	ND
MI:CHARLEVOIX	LAKE MICHIGAN	7/ 9/83	ND
MI:MONROE	LAKE ERIE	7/11/83	ND
MI:SOUTH HAVEN	LAKE MICHIGAN	7/11/83	ND
MN:MONTICELLO	MISSISSIPPI RIVER	7/ 6/83	ND
MN:RED WING	MISSISSIPPI RIVER	7/ 7/83	ND
MS:PORT GIBSON	MISSISSIPPI RIVER	7/21/83	ND
NC:CHARLOTTE	CATAWBA RIVER	7/11/83	ND
NC:SOUTHPORT	ATLANTIC OCEAN	7/ 5/83	ND
NE:RULO	MISSOURI RIVER	7/12/83	ND
NJ:BAYSIDE	DELAWARE RIVER	7/12/83	ND
NJ:OYSTER CREEK	OYSTER CREEK	7/ 7/83	ND
NV:BOULDER CITY	COLORADO RIVER	7/ 6/83	ND
NY:OSSINING	HUDSON RIVER	8/10/83	ND
NY:OSWEGO	LAKE ONTARIO	7/28/83	ND
NY:POUGHKEEPSIE	HUDSON RIVER	7/ 6/83	ND
OH:TOLEDO	LAKE ERIE	7/ 1/83	ND

TABLE 11 (CONTINUED)

SURFACE WATER
ANNUAL GAMMA ANALYSIS

1983

LOCATION	SOURCE	DATE COLLECTED	GAMMA pCi/l ± 2s
OR:BRADWOOD	COLUMBIA RIVER	8/ 6/83	ND
PA:DANVILLE	SUSQUEHANNA RIVER	7/13/83	ND
SC:ALLENDALE	SAVANNAH RIVER	7/28/83	ND
SC:BROAD RIVER	BROAD RIVER	7/13/83	ND
SC:HARTSVILLE	LAKE ROBINSON	7/25/83	ND
TN:DAISY	TENNESSEE RIVER	8/ 4/83	ND
TN:KINGSTON	CLINCH RIVER	7/ 6/83	ND
TX:EL PASO	RIO GRANDE	7/26/83	ND
TX:MATAGORDA	COLORADO RIVER	7/20/83	ND
VA:DOSWELL	NORTH ANNA RIVER	7/ 8/83	ND
WA:NORTHPORT	COLUMBIA RIVER	7/ 5/83	ND
WA:RICHLAND	COLUMBIA RIVER	7/13/83	ND
WI:TWO CREEKS	LAKE MICHIGAN	7/12/83	ND
WI:VICTORY	MISSISSIPPI RIVER	7/12/83	ND
WV:WHEELING	OHIO RIVER	7/ 6/83	ND

ND NO GAMMA ACTIVITY DETECTABLE
s SIGMA COUNTING ERROR

Drinking Water

The drinking water program provides ambient radiation monitoring relevant to the effects of the nuclear power industry, natural environmental levels, and other pertinent sources. These data serve to assess trends and anomalies in concentrations, and to compare with standards set forth in the EPA "National Interim Primary Drinking Water Regulations." These regulations provide for approval of supplies when the combined radium-226 and radium-228 levels do not exceed 5 pCi/l, when the gross alpha (excluding radon and uranium) levels do not exceed 15 pCi/l, when tritium levels do not exceed 20,000 pCi/l, when the strontium-90 levels do not exceed 8 pCi/l, and when the gross beta levels do not exceed 50 pCi/l.

Grab samples are taken at 78 sites which are either major population centers or selected nuclear facility environs.

The analyses include (a) tritium on a quarterly basis (b) gross alpha, gross beta, strontium-90 and gamma on annual composites. Radium-226 analyses are performed if the gross alpha exceeds 2 pCi/l; and radium-228 analyses are performed if the radium-226 activity falls between 3 and 5 pCi/l) (c) specific iodine-131 is performed on one quarterly sample per year for each station (d) an annual composite for plutonium-238, -239, uranium-234, -235, -238, for stations which demonstrate gross alpha levels greater than 2 pCi/l.

Tritium analyses are performed by scintillation counting of the distilled samples, gross beta, and gross alpha by evaporating an aliquot on stainless steel planchets for counting, and radium-226 by the standard emanation technique. Strontium-90 is determined by beta counting a strontium carbonate precipitate isolated by ion exchange.

The results of tritium in drinking water analyses for July - September 1983 are shown in Table 12.

All samples were taken as either a single grab sample or composite samples taken over 12 to 14 days.

TABLE 12

DRINKING WATER
TRITIUM CONCENTRATION

JULY - SEPTEMBER 1983

LOCATION	DATE COLLECTED	nCi/l	± 2s
AK:FAIRBANKS	7/ 8/83	0.1	0.2
AL:DOTHAN	7/10/83	0.3	0.2
AL:MONTGOMERY	7/ 5/83	0.2	0.2
AL:MUSCLE SHOALS	7/ 6/83	0.2	0.2
AL:SCOTTSBORO	7/ 8/83	0.2	0.2
CA:BERKELEY	7/15/83	0.3	0.2
CA:LOS ANGELES	7/ 7/83	0.3	0.2
CO:DENVER	7/15/83	0.2	0.2
CO:PLATTEVILLE	7/15/83	0.3	0.2
CT:HARTFORD	7/ 7/83	0.1	0.2
DE:DOVER	7/ 6/83	0.2	0.2
FL:MIAMI	7/ 5/83	0.1	0.2
FL:TAMPA	7/11/83	0.3	0.2
GA:SAVANNAH	7/ 5/83	3.3	0.2
HI:HONOLULU	7/18/83	0.1	0.2
IA:CEDAR RAPIDS	7/12/83	0.2	0.2
ID:BOISE	8/11/83	0.3	0.2
ID:IDAHO FALLS	7/18/83	0.3	0.2
IL:MORRIS	7/ 6/83	0.1	0.2
IL:W. CHICAGO	7/ 5/83	0.1	0.2
KS:TOPEKA	7/ 1/83	0.3	0.2
LA:NEW ORLEANS	7/27/83	0.3	0.2
MA:LAWRENCE	7/18/83	0.1	0.2
MD:BALTIMORE	7/ 1/83	0.5	0.2
MD:CONOWINGO	7/12/83	0.3	0.2
ME:AUGUSTA	7/ 1/83	0.3	0.2
MI:DETROIT	7/13/83	0.5	0.2
MI:GRAND RAPIDS	7/18/83	0.3	0.2
MN:MINNEAPOLIS	7/11/83	0.2	0.2
MN:RED WING	9/ 9/83	0.1	0.2
MS:JACKSON	7/ 5/83	0.1	0.2
MS:PORT GIBSON	7/ 8/83	0.2	0.2
MT:HELENA	7/ 7/83	0.3	0.2
NC:CHARLOTTE	7/11/83	0.4	0.2
NC:WILMINGTON	9/ 9/83	0.1	0.2
ND:BISMARCK	7/ 8/83	0.3	0.2
NE:LINCOLN	7/13/83	0.3	0.2
NH:CONCORD	7/ 5/83	0.2	0.2
NJ:TRENTON	7/14/83	0.3	0.2
NJ:WARETOWN	7/21/83	0.1	0.2
NM:SANTA FE	7/ 6/83	0.2	0.2
NV:LAS VEGAS	7/ 6/83	0.4	0.2
NY:ALBANY	7/ 5/83	0.2	0.2
NY:NEW YORK CITY	8/ 2/83	0.4	0.2
NY:NIAGARA FALLS	7/ 5/83	0.4	0.2
NY:SYRACUSE	8/ 2/83	0.4	0.2

TABLE 12 (CONTINUED)

DRINKING WATER
TRITIUM CONCENTRATION

JULY - SEPTEMBER 1983

LOCATION	DATE COLLECTED	nCi/l	± 2s
OH:CINCINNATI	7/ 5/83	0.3	0.2
OH:COLUMBUS	7/12/83	0.2	0.2
OH:EAST LIVERPOOL	7/ 6/83	0.3	0.2
OH:PAINESVILLE	7/ 7/83	0.2	0.2
OH:TOLEDO	7/ 1/83	0.2	0.2
OK:OKLAHOMA CITY	7/ 6/83	0.3	0.2
OR:PORTLAND	7/ 6/83	0.1	0.2
PA:COLUMBIA	7/14/83	0.1	0.2
PA:HARRISBURG	7/13/83	0.2	0.2
PA:PITTSBURGH	7/ 6/83	0.1	0.2
PC:ANCON	7/26/83	0.3	0.2
RI:PROVIDENCE	7/ 7/83	0.3	0.2
SC:BARNWELL	7/29/83	0.8	0.2
SC:COLUMBIA	7/ 1/83	0.3	0.2
SC:HARTSVILLE	7/11/83	0.2	0.2
SC:JENKINSVILLE	7/ 8/83	0.2	0.2
SC:SENECA	7/12/83	0.4	0.2
TN:CHATTANOOGA	8/15/83	0.4	0.2
TN:KNOXVILLE	7/ 1/83	0.2	0.2
TX:AUSTIN	7/ 7/83	0.3	0.2
VA:DOSWELL	7/26/83	0.1	0.2
VA:LYNCHBURG	7/ 1/83	0.3	0.2
VA:VIRGINIA BEACH	7/11/83	0.2	0.2
WA:RICHLAND	7/13/83	0.1	0.2
WA:SEATTLE	7/ 5/83	0.2	0.2
WI:GENOA CITY	7/12/83	0.1	0.2
WI:MADISON	7/ 5/83	0.1	0.2

s SIGMA COUNTING ERROR

Radon-222 in Drinking Water

Radon-222 in drinking water has previously been considered a source of radiation exposure primarily from an ingestion standpoint. The Office of Radiation Programs (ORP) of the U.S. Environmental Protection Agency (EPA) is investigating radon in water supplies to evaluate the possibility that a major pathway from inhalation exposure may exist in addition to the ingestion pathway. As an inert gas, radon is not chemically bound to the water and consequently can be released during any operation that aerates or agitates water. Depending upon the initial concentration of radon in water, significant quantities of radon could be released in a home or to the general environment.

To determine the scope of this potential problem, a national ground water sampling program has been initiated by the Eastern Environmental Radiation Facility (EERF) to obtain data on radon concentrations in water supplies throughout the country. Sampling kits have been assembled by EERF and distributed to various state health departments. The kit is designed so that state personnel can collect samples from potable water supplies and ship them, without loss of radon other than radioactive decay, to EERF for analysis.

The selection of water supplies to be sampled is handled by two separate methods. Method 1 in which each state collects samples from all groundwater supplies serving at least 1000 people and Method 2 in which the choice of sampling locations and the number of supplies to be sampled is left to the discretion of the state programs. Each state is asked to obtain a representative sampling of ground water supplies within its boundaries. The extent of the sampling efforts and how representative the data are for a given state is determined primarily by the amount of time each state devotes to the program.

The concentrations of radon in water are determined at the EERF by liquid scintillation counting. The limit of detection for this technique using a 50-minute count and a 10-ml sample is 0.16 pCi or 16 pci/l.

The sampling kits are being provided to the various states on a rotating schedule. This schedule is designed to cover the U.S. within approximately two years.

Data will be published as it becomes available.

SECTION III. External Gamma Ambient Monitoring Program

The external gamma monitoring program, which began in October 1978, provides a continuous measurement of ambient gamma exposure rates, including cosmic, at selected sites throughout the continental United States. Data from this program will be used to evaluate fluctuations in natural background due to variations in environmental conditions and to provide a means of monitoring any significant increases in ambient gamma levels due to weapons fallout, reactor operations, etc. Initially, the program will consist of approximately 22 sites representing a wide geographic coverage throughout the country. Hopefully, at some later date additional sites will be added to the program. Although exposure measurements at these few sites are not totally representative of nationwide exposures, they will be indicative of national trends.

The monitoring program utilizes CaF_2:Mn thermoluminescent dosimeters (TLD's). These dosimeters are commercially available glass-bulb type dosimeters with energy compensating shields. A group of four TLD's is located at each station or site. Dosimeters are annealed by the station operator prior to positioning in the field. The dosimeters are returned to EERF for readout on an approximate one-month cycle. Several dosimeters are annealed by the station operator as controls and returned with the exposed field dosimeters to correct for any exposures accumulated during shipment.

Results from the period July - September 1983 are shown in Table 13.

TABLE 13

ENVIRONMENTAL GAMMA AMBIENT MONITORING PROGRAM

LOCATION	DATE RANGE	INTEGRATED EXPOSURE	EXPOSURE RATE	
		MR	MICRO R/HR ± 2 s *	
AL:MONTGOMERY	70583- 80183	3.9	6.1	4.5
AL:MONTGOMERY	90783-100383	4.0	6.5	7.3
CA:BERKELEY	70583- 80183	3.3	5.0	6.4
CA:BERKELEY	80183- 90783	4.6	5.1	7.2
CA:BERKELEY	90783- 93083	3.2	5.8	16.8
CO:DENVER	70583- 80283	8.0	11.8	6.3
CO:DENVER	80283- 80683	11.4	13.6	9.7
CO:DENVER	90683-100383	9.3	14.3	11.4
FL:ORLANDO	70683- 80183	2.8	4.5	9.4
FL:ORLANDO	80183- 90183	4.0	5.4	7.8
FL:ORLANDO	90183-100483	4.6	5.8	16.9
ID:BOISE	71283- 80883	5.8	9.0	12.6
ID:BOISE	80883- 90683	7.3	10.5	11.8
ID:BOISE	90683-101183	11.5	13.7	4.8
IL:CHICAGO	70883- 80883	5.5	7.3	5.5
IL:CHICAGO	80883- 90883	5.2	7.0	9.0
IL:CHICAGO	90983-100783	4.7	7.0	8.6
ND:BISMARCK	70883- 81083	6.0	7.6	5.8
ND:BISMARCK	81083- 90683	6.4	9.9	11.8
ND:BISMARCK	90683-100583	6.3	9.1	13.6
NJ:TRENTON	71283- 80383	5.0	9.5	8.6
NJ:TRENTON	80383- 91483	9.5	9.4	9.3
NJ:TRENTON	91483-100383	4.5	9.8	8.0
NM:SANTA FE	71983- 81283	7.5	13.1	8.7
NM:SANTA FE	81283- 91283	9.7	13.0	5.5
NM:SANTA FE	91283-100783	7.7	12.8	12.7
NV:LAS VEGAS	63083- 80183	4.2	5.4	7.6
NV:LAS VEGAS	80183- 90183	4.9	6.6	8.3
NV:LAS VEGAS	90183- 93083	4.2	6.0	11.6
NY:NEW YORK	71183- 80883	4.5	6.8	7.4
NY:NEW YORK	80883- 91483	6.4	7.2	4.9
NY:NEW YORK	91483-101183	6.5	10.0	6.5
OH:COLUMBUS	70183- 80183	4.5	6.0	8.9
OH:COLUMBUS	80183- 90283	5.6	7.2	6.3
OH:COLUMBUS	90283- 93083	4.9	7.3	12.1
OK:OKLAHOMA CITY	70883- 80983	4.6	6.0	6.2
OK:OKLAHOMA CITY	80983- 90983	4.8	6.4	8.1
OK:OKLAHOMA CITY	90983-101483	6.0	7.1	5.1
OR:PORTLAND	71183- 80483	3.8	6.6	5.5
OR:PORTLAND	80483- 90283	4.7	6.8	12.4
PA:HARRISBURG	70183- 72983	3.9	5.9	7.1
PA:HARRISBURG	72983- 90283	5.0	6.0	8.2
PA:HARRISBURG	90283- 93083	4.1	6.1	13.4
PA:PITTSBURGH	70583- 80283	7.1	10.6	6.1
PA:PITTSBURGH	80283- 90683	9.8	11.6	7.6
PA:PITTSBURGH	90683-100383	8.1	12.4	4.1

TABLE 13 (CONTINUED)

ENVIRONMENTAL GAMMA AMBIENT MONITORING PROGRAM

LOCATION	DATE RANGE	INTEGRATED EXPOSURE	EXPOSURE RATE	
		MR	MICRO R/HR ± 2 s *	
RI:PROVIDENCE	70783- 80483	6.2	9.3	6.7
RI:PROVIDENCE	80883- 90983	8.0	9.2	7.1
RI:PROVIDENCE	90983-100683	6.1	9.4	8.0
SC:BARNWELL	80583- 90883	6.2	7.6	12.4
SC:BARNWELL	90883-100683	4.9	7.2	6.2
SC:COLUMBIA	70183- 80283	5.1	6.7	15.3
SC:COLUMBIA	80283- 90283	5.9	8.0	6.7
SC:COLUMBIA	90283- 93083	5.4	8.0	9.3
TN:KNOXVILLE	63083- 80883	7.4	7.9	7.2
TN:KNOXVILLE	80883- 90883	6.5	8.8	36.3
TN:KNOXVILLE	90883- 93083	4.9	9.3	11.5
VA:RICHMOND	70783- 80283	3.7	5.9	4.4
VA:RICHMOND	80283-100383	11.1	7.5	4.7
VT:MONTPELIER	70783- 81283	6.5	7.5	5.1
VT:MONTPELIER	81283- 90683	3.6	6.0	8.7
VT:MONTPELIER	90683-100383	4.4	6.9	6.6

* s = SIGMA ERROR (IN PERCENT)

SECTION IV. Milk Program

Pasteurized Milk

This is a cooperative program of the EPA, ORP and the Dairy and Lipid Products Branch, Milk Sanitation Section, Food and Drug Administration. Milk is a reliable indicator of the general populations intake of radionuclides since it is consumed by a large segment of the population and contains several of the biologically important contaminants resulting from environmental releases from nuclear activities. A primary function of this program is to obtain reliable monitoring data relative to current radionuclide concentrations and determine any long-term trends.

Monthly samples are collected at 65 sampling sites with one or more located in each state, Puerto Rico, and the Panama Canal. These are composite samples representing more than 80 percent of the milk consumed in a given population center.

These samples are analyzed for iodine-131, barium-140, cesium-137, and potassium. All 65 samples are analyzed annually in July for strontium-89, and strontium-90. Also, for the first month of the three quarters beginning January, April and October, 10 regional composite samples of milk made up from the states within each of EPA's 10 regions are analyzed for strontium-89 and strontium-90.

Iodine-131, barium-140, cesium-137 and potassium are determined by gamma spectral analysis. Strontium-89 and strontium-90 are determined by beta counting a total strontium precipitate which has been chemically separated by ion-exchange.

The values from the pasteurized milk samples for July - September 1983 are shown in Tables 14 - 16.

Strontium values from regional composite samples collected July - September 1983 are shown in Table 17.

Tritium in Milk

It was previously proposed to analyze all 65 milk samples for tritium in the aqueous and organic phases, on an annual basis (on the April sample). The EERF is currently evaluating alternative analytical techniques anticipating that these analyses will begin during the coming year.

TABLE 14

CONCENTRATIONS OF RADIONUCLIDES IN PASTEURIZED MILK

JULY 1983

LOCATION	DATE COLLECTED	K g/l±2s	^{137}Cs pCi/l±2s	^{140}Ba pCi/l±2s	^{131}I pCi/l±2s
AL:MONTGOMERY	7/ 7/83	1.62 0.13	-3 7	-1 9	1 7
AR:LITTLE ROCK	7/11/83	1.59 0.13	1 7	2 9	-1 7
AZ:PHOENIX	7/ 7/83	1.59 0.13	-1 7	0 9	-1 7
CA:LOS ANGELES	7/15/83	1.61 0.13	2 7	-5 9	-3 7
CA:SAN FRANCISCO	7/ 6/83	1.53 0.12	4 7	-2 9	1 7
CT:HARTFORD	7/11/83	1.54 0.12	1 7	-5 9	-2 7
DC:WASHINGTON	7/ 1/83	1.66 0.13	2 7	-3 9	-3 7
FL:TAMPA	7/ 5/83	1.59 0.13	6 7	-1 9	0 7
GA:ATLANTA	7/ 1/83	1.66 0.24	-2 16	-9 20	-11 14
HI:HONOLULU	7/ 5/83	1.72 0.09	5 5	-6 6	-2 5
IA:DES MOINES	7/ 5/83	1.54 0.12	5 7	-5 9	-1 7
ID:IDAHO FALLS	7/27/83	1.58 0.09	-1 5	-4 6	0 5
IL:CHICAGO	7/ 5/83	1.55 0.12	0 7	-1 9	-2 7
IN:INDIANAPOLIS	7/ 5/83	1.59 0.13	2 7	-6 9	0 7
KS:WICHITA	7/12/83	1.46 0.12	-1 7	4 9	0 7
KY:LOUISVILLE	7/ 5/83	1.57 0.13	0 7	3 9	-2 7
LA:NEW ORLEANS	7/15/83	1.52 0.12	6 7	-1 9	1 7
MA:BOSTON	7/ 5/83	1.65 0.13	7 7	-3 9	-1 7
MD:BALTIMORE	7/ 1/83	1.51 0.12	5 7	0 9	2 7
ME:PORTLAND	7/ 5/83	1.47 0.12	5 7	2 9	1 7
MI:DETROIT	7/ 7/83	1.45 0.12	6 7	-2 9	-3 7
MI:GRAND RAPIDS	7/ 5/83	1.58 0.13	5 7	-3 9	8 7
MN:MINNEAPOLIS	7/18/83	1.53 0.12	5 7	1 9	0 7
MN:ST PAUL	7/ 6/83	1.44 0.12	1 7	1 9	2 7
MO:KANSAS CITY	7/ 7/83	1.56 0.12	0 7	0 9	-2 7
MO:ST LOUIS	7/ 6/83	1.60 0.09	2 5	0 6	-2 5
MS:JACKSON	7/ 7/83	1.63 0.13	4 7	5 9	-3 7
MT:HELENA	7/ 5/83	1.63 0.13	-2 7	-2 9	2 7
NC:CHARLOTTE	7/ 1/83	1.74 0.24	-3 16	-11 20	3 14
ND:MINOT	7/11/83	1.69 0.09	-4 5	-2 6	-1 5
NE:OMAHA	7/11/83	1.33 0.12	1 7	5 9	-2 7
NH:MANCHESTER	7/11/83	1.59 0.09	5 5	0 6	0 5
NJ:TRENTON	7/ 7/83	1.63 0.13	0 7	-3 9	-5 7
NM:ALBUQUERQUE	7/ 5/83	1.51 0.12	3 7	-9 9	-2 7
NV:LAS VEGAS	7/11/83	1.59 0.24	-16 15	0 20	-6 14
NY:BUFFALO	7/ 5/83	1.69 0.09	1 5	-2 6	-2 5
NY:NEW YORK CITY	7/11/83	1.56 0.12	2 7	-5 9	4 7
NY:SYRACUSE	7/ 5/83	1.58 0.12	3 7	-6 9	1 7
OH:CINCINNATI	7/11/83	1.70 0.13	-3 7	-3 9	-4 7
OH:CLEVELAND	7/ 6/83	1.43 0.12	3 7	-1 9	-1 7
OK:OKLAHOMA CITY	7/ 5/83	1.47 0.08	-1 5	-1 6	0 5
PA:PITTSBURGH	7/ 6/83	1.55 0.12	2 7	1 9	4 7
PR:SAN JUAN	7/22/83	1.62 0.13	-1 7	-8 9	1 7
SC:CHARLESTON	7/14/83	1.64 0.24	13 16	6 21	-2 14

TABLE 14 (CONTINUED)

CONCENTRATIONS OF RADIONUCLIDES IN PASTEURIZED MILK

JULY 1983

LOCATION	DATE COLLECTED	K g/l±2s	^{137}Cs pCi/l±2s	^{140}Ba pCi/l±2s	^{131}I pCi/l±2s
TN:CHATTANOOGA	7/ 5/83	1.61 0.13	2 7	4 9	-2 7
TN:KNOXVILLE	7/ 5/83	1.68 0.17	-5 11	2 14	-7 10
TN:MEMPHIS	7/27/83	1.52 0.12	6 7	-8 9	-3 7
TX:AUSTIN	7/11/83	1.54 0.12	-3 7	-3 9	-3 7
UT:SALT LAKE CITY	7/ 5/83	1.57 0.12	4 7	-4 9	2 7
VA:NORFOLK	7/18/83	1.66 0.09	1 5	2 6	0 5
VT:BURLINGTON	7/ 5/83	1.54 0.12	1 7	-4 9	3 7
WA:SEATTLE	7/ 1/83	1.52 0.12	-2 7	-1 9	-6 7
WA:SEATTLE	7/29/83	1.42 0.12	1 7	-2 9	2 7
WI:MILWAUKEE	7/ 1/83	1.56 0.09	-1 5	0 6	-3 5
WV:CHARLESTON	7/27/83	1.55 0.12	2 7	-7 9	0 7
WY:LARAMIE	7/11/83	1.58 0.12	0 7	-4 9	1 7

s SIGMA COUNTING ERROR

TABLE 15

CONCENTRATIONS OF RADIONUCLIDES IN PASTEURIZED MILK

AUGUST 1983

LOCATION	DATE COLLECTED	K g/l±2s	^{137}Cs pCi/l±2s		^{140}Ba pCi/l±2s		^{131}I pCi/l±2s	
AK:ANCHORAGE	8/ 3/83	1.54 0.12	-3	7	0	9	-4	7
AL:MONTGOMERY	8/ 5/83	1.60 0.13	3	7	-6	9	0	7
AR:LITTLE ROCK	8/ 1/83	1.72 0.13	-3	7	-2	9	2	7
AZ:PHOENIX	8/ 9/83	1.51 0.12	-2	7	0	9	1	7
CA:LOS ANGELES	8/10/83	1.56 0.12	-3	7	2	9	-6	7
CA:SACRAMENTO	8/ 1/83	1.58 0.13	-1	7	-1	9	0	7
CA:SAN FRANCISCO	8/ 2/83	1.62 0.13	0	7	-5	9	0	7
CO:DENVER	8/ 1/83	1.74 0.17	2	11	7	15	-7	10
CT:HARTFORD	8/ 1/83	1.57 0.12	5	7	0	9	-1	7
DC:WASHINGTON	8/ 5/83	1.62 0.13	2	7	-1	9	-2	7
FL:TAMPA	8/ 9/83	1.45 0.12	9	7	0	9	-5	7
GA:ATLANTA	8/ 5/83	1.55 0.12	1	7	2	9	1	7
HI:HONOLULU	8/ 2/83	1.73 0.13	4	7	-3	9	2	7
IA:DES MOINES	8/ 1/83	1.67 0.13	-2	7	-4	9	1	7
ID:IDAHO FALLS	8/15/83	1.65 0.24	2	16	2	20	1	14
IL:CHICAGO	8/ 2/83	1.60 0.09	-2	5	-2	6	-3	5
IN:INDIANAPOLIS	8/ 8/83	1.61 0.13	1	7	-6	9	2	7
KS:WICHITA	8/ 2/83	1.48 0.12	-2	7	0	9	-1	7
KY:LOUISVILLE	8/ 8/83	1.54 0.12	1	7	3	9	-3	7
LA:NEW ORLEANS	8/ 4/83	1.55 0.12	3	7	5	9	-3	7
MA:BOSTON	8/ 9/83	1.65 0.09	4	5	-2	6	-4	5
MD:BALTIMORE	8/ 5/83	1.62 0.13	1	7	-3	9	-3	7
ME:PORTLAND	8/ 9/83	1.54 0.12	6	7	-1	9	-1	7
MI:DETROIT	8/11/83	1.60 0.13	2	7	-5	9	0	7
MI:GRAND RAPIDS	8/ 8/83	1.63 0.24	-4	16	3	20	2	14
MN:MINNEAPOLIS	8/ 8/83	1.61 0.13	2	7	3	9	-3	7
MN:ST PAUL	8/ 2/83	1.49 0.12	-4	7	3	9	0	7
MO:KANSAS CITY	8/ 4/83	1.65 0.09	2	5	-4	6	-5	5
MO:ST LOUIS	8/ 3/83	1.75 0.13	0	7	-1	9	-1	7
MS:JACKSON	8/ 8/83	1.64 0.13	-3	7	3	9	-2	7
MT:HELENA	8/ 2/83	1.52 0.12	2	7	-6	9	-4	7
NC:CHARLOTTE	8/ 1/83	1.82 0.25	-13	15	-10	20	-5	14
ND:MINOT	8/ 1/83	1.59 0.13	3	7	-6	9	0	7
NE:OMAHA	8/ 5/83	1.37 0.12	-2	7	-7	9	-2	7
NH:MANCHESTER	8/ 1/83	1.54 0.12	-2	7	-2	9	-3	7
NJ:TRENTON	8/ 4/83	1.61 0.09	-3	5	-6	6	-2	5
NM:ALBUQUERQUE	8/ 8/83	1.57 0.12	-2	7	-4	9	0	7
NV:LAS VEGAS	8/ 1/83	1.67 0.09	0	5	-5	6	0	5
NY:BUFFALO	8/ 2/83	1.58 0.12	1	7	-5	9	4	7
NY:NEW YORK CITY	8/ 1/83	1.55 0.12	0	7	-3	9	-2	7
NY:SYRACUSE	8/ 1/83	1.73 0.13	8	7	1	9	-3	7
OH:CINCINNATI	8/ 1/83	1.65 0.13	1	7	-4	9	-5	7
OH:CLEVELAND	8/ 9/83	1.65 0.13	2	7	2	9	-5	7
OK:OKLAHOMA CITY	8/ 1/83	1.48 0.12	3	7	-2	9	-3	7

TABLE 15 (CONTINUED)

CONCENTRATIONS OF RADIONUCLIDES IN PASTEURIZED MILK

AUGUST 1983

LOCATION	DATE COLLECTED	K g/l±2s	^{137}Cs pCi/l±2s	^{140}Ba pCi/l±2s	^{131}I pCi/l±2s
OR:PORTLAND	8/ 9/83	1.53 0.12	0 7	1 9	1 7
PA:PHILADELPHIA	8/ 8/83	1.61 0.13	1 7	2 9	-5 7
PA:PITTSBURGH	8/10/83	1.54 0.12	0 7	-5 9	-2 7
PR:SAN JUAN	8/19/83	1.54 0.12	1 7	0 9	4 7
SC:CHARLESTON	8/ 9/83	1.78 0.18	-4 11	0 14	-6 10
TN:CHATTANOOGA	8/ 1/83	1.58 0.12	1 7	-2 9	-6 7
TN:KNOXVILLE	8/ 2/83	1.79 0.25	1 16	-13 20	-2 14
TN:MEMPHIS	8/25/83	1.51 0.12	-3 7	-3 9	4 7
TX:AUSTIN	8/ 3/83	1.65 0.09	1 5	-8 6	0 5
UT:SALT LAKE CITY	8/ 1/83	1.50 0.12	2 7	1 9	-2 7
VA:NORFOLK	8/16/83	1.65 0.13	-5 7	-2 9	0 7
VT:BURLINGTON	8/16/83	1.47 0.12	-1 7	8 9	-4 7
WA:SPOKANE	8/ 1/83	1.58 0.08	2 5	-4 6	-4 5
WI:MILWAUKEE	8/ 1/83	1.65 0.13	0 7	-5 9	0 7
WV:CHARLESTON	8/29/83	1.52 0.08	2 5	0 6	0 5
WY:LARAMIE	8/ 5/83	1.54 0.12	-2 7	4 9	0 7

s SIGMA COUNTING ERROR

TABLE 16

CONCENTRATIONS OF RADIONUCLIDES IN PASTEURIZED MILK

SEPTEMBER 1983

LOCATION	DATE COLLECTED	K g/l±2s	^{137}Cs pCi/l±2s	^{140}Ba pCi/l±2s	^{131}I pCi/l±2s
AL:MONTGOMERY	9/ 8/83	1.60 0.13	-5 7	-6 9	-1 7
AR:LITTLE ROCK	9/ 6/83	1.63 0.13	-1 7	-3 9	1 7
AZ:PHOENIX	9/ 7/83	1.61 0.13	-4 7	-6 9	-1 7
CA:SACRAMENTO	9/ 6/83	1.55 0.12	2 7	3 9	2 7
CA:SAN FRANCISCO	9/ 7/83	1.55 0.09	1 5	-6 6	-2 5
CO:DENVER	9/ 2/83	1.54 0.12	-1 7	-3 9	0 7
CT:HARTFORD	9/13/83	1.52 0.12	3 7	-1 9	-2 7
DC:WASHINGTON	9/ 2/83	1.65 0.13	2 7	-3 9	4 7
FL:TAMPA	9/ 6/83	1.58 0.09	7 5	7 6	1 5
GA:ATLANTA	9/ 1/83	1.66 0.13	0 7	-5 9	-3 7
HI:HONOLULU	9/ 6/83	1.73 0.13	-1 7	0 9	-1 7
IA:DES MOINES	9/ 6/83	1.57 0.13	-6 7	5 9	-3 7
ID:IDAHO FALLS	9/14/83	1.73 0.24	-2 14	-1 20	-5 14
IL:CHICAGO	9/ 6/83	1.49 0.12	2 7	2 9	4 7
IN:INDIANAPOLIS	9/ 6/83	1.58 0.12	1 7	-5 9	4 7
KS:WICHITA	9/ 8/83	1.65 0.13	7 7	-5 9	2 7
KY:LOUISVILLE	9/ 6/83	1.58 0.12	1 7	-2 9	-1 7
LA:NEW ORLEANS	9/ 6/83	1.66 0.13	10 7	6 9	-1 7
MA:BOSTON	9/13/83	1.58 0.12	5 7	-3 9	-1 7
MD:BALTIMORE	9/ 2/83	1.61 0.09	-4 5	-5 6	-4 5
ME:PORTLAND	9/ 6/83	1.60 0.09	8 5	-3 6	2 5
MI:DETROIT	9/ 8/83	1.66 0.13	-2 7	3 9	-5 7
MI:GRAND RAPIDS	9/ 6/83	1.57 0.12	-1 7	0 9	1 7
MN:MINNEAPOLIS	9/ 6/83	1.61 0.13	0 7	-3 9	0 7
MN:ST PAUL	9/ 7/83	1.55 0.12	5 7	-4 9	3 7
MO:KANSAS CITY	9/ 8/83	1.65 0.13	1 7	1 9	3 7
MO:ST LOUIS	9/ 7/83	1.58 0.13	1 7	9 9	0 7
MS:JACKSON	9/12/83	1.62 0.13	5 7	-8 9	0 7
MT:HELENA	9/ 6/83	1.49 0.12	1 7	-4 9	-2 7
NC:CHARLOTTE	9/ 6/83	1.69 0.23	2 14	5 20	4 14
ND:MINOT	9/19/83	1.51 0.12	-1 7	-3 9	2 7
NE:OMAHA	9/ 9/83	1.51 0.08	0 5	1 6	-4 5
NH:MANCHESTER	9/12/83	1.60 0.13	6 7	-4 9	-3 7
NJ:TRENTON	9/ 1/83	1.65 0.13	-1 7	-5 9	1 7
NM:ALBUQUERQUE	9/ 6/83	1.52 0.08	3 5	-2 6	6 5
NY:BUFFALO	9/12/83	1.62 0.13	-2 7	-1 9	-2 7
NY:NEW YORK CITY	9/12/83	1.52 0.08	0 5	2 6	-1 5
NY:SYRACUSE	9/ 6/83	1.59 0.13	6 7	3 9	2 7
OH:CINCINNATI	9/ 6/83	1.62 0.13	4 7	5 9	2 7
OH:CLEVELAND	9/ 7/83	1.50 0.08	4 5	0 6	3 5
OK:OKLAHOMA CITY	9/ 6/83	1.58 0.12	1 7	1 9	6 7
PA:PHILADELPHIA	9/ 6/83	1.56 0.12	-3 7	1 9	-5 7
PA:PITTSBURGH	9/ 7/83	1.54 0.12	5 7	2 9	1 7
PC:CRISTOBAL	9/15/83	1.51 0.12	14 7	-7 9	-3 7

TABLE 16 (CONTINUED)

CONCENTRATIONS OF RADIONUCLIDES IN PASTEURIZED MILK

SEPTEMBER 1983

LOCATION	DATE COLLECTED	K g/l±2s	^{137}Cs pCi/l±2s	^{140}Ba pCi/l±2s	^{131}I pCi/l±2s
PR:SAN JUAN	9/13/83	1.59 0.12	1 7	-7 9	2 7
SC:CHARLESTON	9/14/83	1.63 0.13	0 7	1 9	-8 7
TN:CHATTANOOGA	9/ 6/83	1.49 0.12	4 7	2 9	4 7
TN:KNOXVILLE	9/ 6/83	1.54 0.24	-2 16	0 20	7 14
TN:MEMPHIS	9/29/83	1.60 0.13	7 7	2 9	-3 7
TX:AUSTIN	9/ 6/83	1.54 0.12	4 7	2 9	0 7
UT:SALT LAKE CITY	9/12/83	1.58 0.09	0 5	-4 6	-2 5
VA:NORFOLK	9/16/83	1.48 0.12	-1 7	-2 9	-1 7
VT:BURLINGTON	9/ 2/83	1.46 0.12	-2 7	0 9	-3 7
WA:SEATTLE	9/ 6/83	1.60 0.09	3 5	-2 6	8 6
WA:SPOKANE	9/ 5/83	1.58 0.13	3 7	8 9	3 7
WI:MILWAUKEE	9/ 1/83	1.52 0.12	1 7	2 9	1 7
WV:CHARLESTON	9/27/83	1.60 0.13	0 7	1 9	0 7
WY:LARAMIE	9/ 6/83	1.47 0.12	5 7	0 9	2 7

s SIGMA COUNTING ERROR

TABLE 17

STRONTIUM-90 AND STRONTIUM-89 IN PASTEURIZED MILK

ANNUAL REPORT

JULY - SEPTEMBER 1983

EPA LOCATION		^{90}Sr pCi/l ± 2s		^{89}Sr pCi/l ± 2s*	
AK:ANCHORAGE	8/ 3/83	1.8	0.7	0	1
AL:MONTGOMERY	7/ 7/83	1.1	1.0	2	1
AR:LITTLE ROCK	7/11/83	4.3	0.6	2	1
AZ:PHOENIX	7/ 7/83	0.5	0.1	0	0
CA:LOS ANGELES	7/15/83	1.0	0.3	0	0
CA:SACRAMENTO	8/ 1/83	1.4	0.4	0	0
CA:SAN FRANCISCO	7/ 6/83	0.6	0.2	1	0
CO:DENVER	7/ 1/83	1.4	0.5	1	1
CT:HARTFORD	7/11/83	2.4	0.4	1	0
DC:WASHINGTON	7/ 1/83	2.5	0.8	0	1
FL:TAMPA	7/ 5/83	1.4	0.3	0	0
GA:ATLANTA	7/ 1/83	1.5	0.8	3	1
HI:HONOLULU	7/ 5/83	-0.3	1.1	3	1
IA:DES MOINES	7/ 5/83	2.1	0.5	0	1
ID:IDAHO FALLS	7/27/83	2.2	0.6	-1	1
IL:CHICAGO	7/ 5/83	2.0	0.3	1	0
IN:INDIANAPOLIS	7/ 5/83	2.3	0.8	1	1
KS:WICHITA	7/12/83	1.8	1.5	2	2
KY:LOUISVILLE	7/ 5/83	3.1	0.2	1	0
LA:NEW ORLEANS	7/15/83	3.2	1.8	1	2
MA:BOSTON	7/ 5/83	3.6	0.6	1	1
MD:BALTIMORE	7/ 1/83	2.5	0.3	0	0
ME:PORTLAND	7/ 5/83	3.1	0.6	0	1
MI:DETROIT	7/ 7/83	3.9	0.9	0	1
MI:GRAND RAPIDS	7/ 5/83	3.2	0.3	1	0
MN:MINNEAPOLIS	7/18/83	4.1	0.6	1	1
MN:ST. PAUL	7/ 6/83	3.1	0.6	1	1
MO:KANSAS CITY	7/ 7/83	3.3	0.4	0	1
MO:ST. LOUIS	7/ 6/83	2.6	0.4	0	1
MS:JACKSON	7/ 7/83	4.1	0.7	1	1
MT:HELENA	7/ 5/83	1.3	0.2	1	0
NC:CHARLOTTE	7/ 1/83	2.3	0.8	2	1
ND:MINOT	7/11/83	4.1	0.9	0	1
NE:OMAHA	7/11/83	3.0	0.8	0	1
NH:MANCHESTER	7/11/83	3.3	0.7	1	1
NJ:TRENTON	7/ 7/83	4.3	0.9	-1	1
NM:ALBUQUERQUE	7/ 5/83	0.8	0.2	1	0
NV:LAS VEGAS	7/11/83	-0.1	0.6	1	1
NY:BUFFALO	7/ 5/83	2.8	0.6	0	1
NY:NEW YORK CITY	7/11/83	2.3	0.3	2	0
NY:SYRACUSE	7/ 5/83	2.4	1.0	1	1
OH:CINCINNATI	7/11/83	1.9	0.5	0	1
OH:CLEVELAND	7/ 6/83	1.9	0.8	2	1

TABLE 17 (CONTINUED)

STRONTIUM-90 AND STRONTIUM-89 IN PASTEURIZED MILK

ANNUAL REPORT

JULY - SEPTEMBER 1983

EPA LOCATION		^{90}Sr pCi/l ± 2s		^{89}Sr pCi/l ± 2s*	
OK:OKLAHOMA CITY	7/ 5/83	1.4	0.4	2	1
OR:PORTLAND	8/ 9/83	1.7	0.7	1	1
PA:PHILADELPHIA	8/ 8/83	3.0	1.4	1	2
PA:PITTSBURGH	7/ 6/83	3.4	0.8	1	1
PR:SAN JUAN	7/22/83	1.0	0.3	0	0
SC:CHARLESTON	7/14/83	1.0	1.9	2	2
SD:RAPID CITY	7/ 1/83	3.6	0.5	-1	1
TN:CHATTANOOGA	7/ 5/83	3.2	0.5	0	1
TN:KNOXVILLE	7/ 5/83	3.0	0.9	0	1
TN:MEMPHIS	7/27/83	2.1	0.5	1	1
TX:AUSTIN	7/11/83	-0.5	1.9	2	2
UT:SALT LAKE CITY	7/ 5/83	0.8	0.2	1	0
VA:NORFOLK	7/18/83	1.8	85.0	1	1
VT:BURLINGTON	7/ 5/83	1.7	0.3	1	0
WA:SEATTLE	7/ 1/83	1.9	0.5	0	1
WA:SPOKANE	8/ 1/83	1.7	0.2	0	0
WI:MILWAUKEE	7/ 1/83	1.9	1.3	1	2
WV:CHARLESTON	7/27/83	4.0	0.4	0	1
WY:LARAMIE	7/11/83	2.3	0.3	1	0

s SIGMA COUNTING ERROR

s* ANALYTICAL ERROR TERM WHICH CLOSELY APPROXIMATES THE COUNTING ERROR

Carbon-14 in Milk

Nine stations, chosen for wide geographical distribution, contribute milk samples for annual analysis for carbon-14. These samples have monitored the carbon-14 levels in the food chain resulting from nuclear testing.

Analysis consists of combusting the samples and measuring released carbon dioxide through liquid scintillation.

Data will be published as it becomes available.

Radiological Health Laboratory
Indiana State Board of Health

Indiana Milk Analysis Program

In order to evaluate the fallout on Indiana pasturelands, the State has implemented a program whereby monthly milk samples from five geographical areas are sent to the Radiological Health Laboratory of the State Board of Health. The milk in these samples is bottled on the same date in all five areas to provide uniform time from pasture to the lab.

Once in the laboratory, the milk is first analyzed by gamma spectroscopy for iodine-131, barium-140, cesium-137, and potassium-40. A one gallon sample is analyzed on a 3" x 3" NaI(Tl) scintillation crystal for 4800 seconds. A background sample of 48,000 seconds is also run. The data are analyzed to give pCi/l for each radionuclide.

A quarterly composite sample is saved and run for strontium-89 and -90 by ion exchange method.

Data will be published as it is received.

Radiological Health Division
State Hygienic Laboratory of Iowa

Iowa Water Sampling Program

The radiological Health Division of the State Hygienic Laboratory of Iowa with the assistance of the State Department of Environmental Quality (DEQ) maintains a state-wide water sampling program of community drinking waters, surface waters and precipitation. All analyses with the exception of the sequential Ra-226, -228 analyses are performed according to "Standard Methods for the Examination of Water and Wastewater", 14th edition. The sequential analyses for radiums are performed according to the EPA publication, EPA-600/4-75-008, "Interim Radiochemical Methodology for Drinking Water."

The drinking water samples are collected by DEQ regional personnel and sent to the State Hygienic Laboratory where they are preserved with HCl. These waters are analyzed for gross alpha and gross beta radioactivity as a screening process. Subsequent analyses for Ra-226, Ra-228, Sr-90 are performed if screening levels are exceeded. Radium levels are of primary concern in Iowa drinking waters as those levels are elevated in deep geologic aquifers within the state.

Surface waters are collected at eleven sites throughout the state with site selection being determined by proximity upstream and downstream to nuclear power plants in Iowa or those plants discharging into rivers which are natural borders with adjoining states. Gross alpha, gross beta, and tritium are the routine radionuclide analyses for these samples. Strontium is of interest when gross beta screening levels are exceeded or if nuclear weapons testing necessitates monitoring to determine its impact on the environment.

Data will be published as it is received.

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